

CSI: Center for Sludge Information
Advocacy through Acquisition, Analysis and Articulation of Information re:

Land Application of Sewage Sludge

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9-9-99

to: Todd Thompson, Associate Water Resources Control Engineer
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State Water Resources Control Board
P.O. Box 944213
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re: Draft Environmental Impact Report: General Order for General Waste Discharge Requirements for the Discharge of Sewage Sludge to Land for use in Agriculture, Silviculture, Horticulture and Land Reclamation Activities in California.

Mr. Thompson;

CSI appreciates the opportunity to submit comments on the DEIR regarding this proposed General Order, and having received from you a copy of that document and the 12-98 Scoping Report. CSI participated in the scoping process by attending the hearing in Bakersfield on 11-10-98 and submitting written comments on 11-30-98.

In those comments, CSI wrote that, "The development of effective state policy ... and the facilitation of public participation in that process, require a comprehensive analysis of the context in which these proposed GWDRs are conceived, general concepts applied to their formulation, and specific aspects of their implementation." CSI's comments were organized into 3 categories: "Context", "General" and "Specific Sections". CSI wrote, "Comprehensive and detailed analyses of all these factors must be included in the Draft EIR."

CSI also listed a number of documents as references supportive of its comments regarding the scope of issues and analytical methodology pertinent to the DEIR, and wrote "all of these documents warrant extensive analysis and incorporation into the DEIR scoping process and the formulation of the DEIR and eventual GO."

CSI has completed its examination of the DEIR and finds it substantially deficient in a number of areas of paramount importance. The SWRCB's analysis of environmental impacts and conclusions regarding their significance, its means of processing and presenting information in the DEIR, and discharge of its regulatory obligations under CEQA have resulted in a DEIR and Draft GWDRs with many failures. Not the least of these is the DEIR's failure to be conducive to the development of effective policy and public participation in that process. CSI recommends rectification of these failures in these comments.

CSI submits comments organized into three major topics: Context / General, Demonstrative Exclusions / Inclusions, and Impacts / Controversy, a reference list, and two addenda appended hereto. Addendum #2 is CSI's 11-30-98 Scoping comment letter, the table of contents of which is included herein (minus topics addressed in these comments), below. There are still pertinent and unresolved issues addressed therein.

In the Context / General section, CSI addresses the inadequacies in the DEIR's presentation of information about the generation and distribution of sewage sludge in California, the vague analysis of sewage sludge quality and neglect of fundamental regulatory incentives toward quality improvement, the SWRCB's failure to examine and/or consider alternative approaches adopted by other practitioners and regulators, and the absence of information regarding the degree to which agencies are capable of identifying and quantifying impacts and ensuring compliance.

In the Demonstrative Exclusions / Inclusions section, CSI cites the SWRCB's deliberate selectivity and misrepresentation of information as evidenced by the

manipulation of two scientific reports in the DEIR, demonstrates that the manner of inclusion and exclusion of information is identical to the means employed by the public-relations organs of the industry promoting and profiting from the activity the SWRCB regulates, and exposes the erroneous ends to which both put this research.

In the Impacts / Controversy section, CSI addresses the erroneous, insupportable and unsubstantiated conclusions drawn in the DEIR regarding impact significance and the safety of land application under the GO, the unacceptability of the DEIR's presentation of information regarding impact potential and the consequences of the controversy regarding risks associated with this type of waste discharge, exemplifies this with two impact cases-in-point entailing impact under-estimation, regulatory-neglect and controversy-inducement.

An outline of the above sections is presented below.

An introduction to Addendum #1 is included here, whereby CSI submits research regarding impacts categorized by contaminant and pathway, the focal points of the controversy about safety and regulatory adequacy, and general and project-specific recommendations for effective regulation and mitigation. Addendum #1 is the primary foundation of CSI's comments and contention that the DEIR is unacceptable and the Draft GO is inadequate.

CSI wishes to register its disappointment and disagreement with the SWRCB's decision to not perform a risk-assessment analysis in formulating the GWDRs and the DEIR. The Calif. Dep't. of Food & Agriculture is currently conducting such an analysis pursuant to developing contaminant concentration limits for fertilizers and sewage sludge. Background soil quality data incorporated into the CDFA assessment and CDFA's preliminary limits for three heavy metals are referenced herein (158, 159). Information necessary to perform such an analysis is readily available to the SWRCB as clarified in the "Quality Analysis / Incentivization" section of these comments. The SWRCB's refusal to conduct such an analysis appears to be based on policy, as opposed to an empirical examination of evidence. The SWRCB should explain the rationale for this decision, and its diversion from the direction the CDFA is pursuing.

CSI also wishes to record that its efforts to acquire the California Association of Sanitation Agencies (CASA) sewage sludge surveys from both the SWRCB & CASA have failed, despite repeated requests for this information. This information is generated from municipal publicly owned treatment works (POTWs), collected by its representative organization (CASA) and referred to in the DEIR of the State (publicly financed) WRCB, which is financed by the applicant under CEQA for the DEIR, CASA. CSI, hereby, again requests that it be provided with this information. The SWRCB should explain its rationale in the event it decides not to satisfy this request.

COMMENT OUTLINE

CONTEXT/GENERAL
GENERATION/DISTRIBUTION
QUALITY ANALYSIS / INCENTIVIZATION
REGULATORY ALTERNATIVE APPROACHES & METHODS / STANDARDS & LIMITS
IMPACT DATA - BASE / COMPLIANCE - ENFORCEMENT HISTORY - RECORDS
DEMONSTRATIVE EXCLUSIONS / INCLUSIONS
NRC 1996 REPORT
OHIO 1985 FARM STUDY
IMPACTS / CONTROVERSY
CONCLUSIONS
Impact Significance
Regulatory Safety
DEIR UNACCEPTABILITY
EXAMPLES
ADDENDUM #1
Addenda Tables of Contents
Reference List

ADDENDA

- 1: CSI Submission re: Impacts, Regulatory Safety, Recommendations
- 2: CSI 11-30-98 Scoping Comment Sections Included in DEIR Comments by
Reference and Addendum: Context, General, Specific Sections

CONTEXT/GENERAL

GENERATION/DISTRIBUTION

Quantitative Analysis

CSI wrote that the DEIR should present tabulated information regarding the quantity of sewage sludge generated in "each county and by each POTW", and that the data for this is included in the Annual Biosolids Reports of the state's POTWs. CSI also wrote that the "projected increase" due to three factors (population increase, sewerization of urbanizing rural areas, and increasing municipal and regional industrialization) should be quantified.

The DEIR presents some information regarding the quantity generated in each Water Quality Control Board Region, but neglects to specify the counties or POTWs of origin beyond statements that "most...being reused" originates in five "large urban centers" or "County areas". The DEIR states that its information comes from CASA (California Association of Sanitary Agencies) survey of 120 POTWs, "not all of" which "submitted survey results". The SWRCB has, therefore, elected to use incomplete information provided by CASA (the primary economic beneficiaries of land application's lower costs relative to other disposal options, and the organization paying for the DEIR) and neglected to utilize the more complete, less processed data-base readily available to it (POTW Biosolids Annual Reports). The DEIR presents some information regarding the history of sludge generation in the state and projected future amounts, but bases its projection on only one of the three factors contributory to increased generation.

The DEIR presents some limited and generalized information regarding sources and estimates of past, present and future quantity. The lack of source-specificity, survey-completeness, data-independence, and forecast-accuracy diminish the utility and credibility of this information and, therefore, its contribution to policy development and participation. The SWRCB should present specific, complete, unprocessed, independent and appropriately calculated information, as previously recommended, to provide the reader and respondent an accurate, comprehensive and useful set of data with which to assess the size and origin of the problem. As it is, the DEIR fails to serve this purpose as well as it could and should.

Disposition

CSI wrote that the DEIR should identify the methods of disposal and sites used by each POTW, and should display land application sites on a state map, specifying acreage, rate of application, and crop type. The sources for this information were also cited. The inclusion of various regulatory and economic factors contributing to disposal-option selection was advocated. Analysis of alternative methods of disposal, their technical and financial feasibility, and likely future exploitation was also advocated, citing sources for this information.

The DEIR presents some information regarding the history and proportional relationship of various disposal options, and amounts of sewage sludge land applied by County and Region in 1998, but neglects to specify methods and sites by POTW, or to display sites on a map, or to specify acreage, rate of application, and crop type. The DEIR provides a generalized history and a projection of future land application based on CASA data, proportional constancy and population increase. The DEIR mentions the "costs of all treatment and disposal options", yet neglects to distinguish relative cost factors contributing to option-selection, e.g. landfilling vs. land application. The DEIR states that "future...destinations...will be affected by" three factors (landfill space, public & political acceptability, and new scientific information), but neglects to mention the development of alternative disposal or treatment techniques.

The DEIR presents some limited and generalized information regarding the disposition of sewage sludge and estimated future land application. The lack of specificity regarding the location, size, application rates, and recipient crops, and the neglect of the effects of regulatory and economic incentives on option-selection and emerging technological advancements reduce the utility of this information. The SWRCB should present detailed, comprehensive, independent and relevant information, as previously recommended, to enable the reader and respondent to identify how much land application is occurring, where and upon what it occurs, the operative influences and motives, and the range of possible future scenarios. As it is, the DEIR fails to serve this purpose as well as it could and should.

43-8

Conclusion

The DEIR fails to provide sufficient, specific and credible information for assessing the generation and distribution of sewage sludge. As such, it also fails the twin objectives regarding effective policy development and public participation facilitation. The DEIR, therefore, is unacceptable.

43-9

The SWRCB elected to use and present incomplete, processed and vague information provided by CASA (the DEIR applicant, financier, policy beneficiary), simultaneously neglecting to utilize and present more comprehensive, detailed and independent information to which it had been referred during the scoping process. It can only be concluded, therefore, that this choice was intentional.

43-10

The SWRCB should remedy these failures.

QUALITY ANALYSIS/INCENTIVIZATION

Qualitative Analysis

CSI wrote that the quality of sewage sludge currently produced in the state should be reported in the DEIR. CSI wrote that the DEIR should report and present information from each POTW identifying: (1) the heavy metal (503 Table 1, 3) and pathogen (Class A, B) quality classifications by US EPA criteria; and (2) the concentrations of all of the constituents identified and quantified. CSI wrote that this information should be tabulated in its unaltered form in an appendix to the DEIR, in addition to any summarization. The SWRCB was referred to the sources of this information: POTW annual Pretreatment and Biosolids Reports.

43-11

CSI wrote that the inclusion of contaminants currently excluded from the 503s and the GO should be considered to provide a more comprehensive quality definition. The SWRCB was directed to sources of information regarding additional contaminants included in the land application standards of other practitioners and in recommendations found in literature on the subject. [9, +9 ref's]

43-12

The inclusion of information regarding quality analysis and control was advocated, including: influent contaminant identification, quantification and frequency; source identification capacity and enforcement success; and pretreatment inspection frequencies regarding industrial and commercial contributors. The SWRCB was similarly referred to annual POTW reports for this information. The inclusion of information regarding advancements in influent and sludge content detection and monitoring capabilities, and regarding technological advancements in treatment processes was advocated.

43-13

The inclusion of information regarding predictable changes in industrial, commercial and domestic contributions to municipal systems, including the number and annual rate of new chemical contributions was advocated. This information is available through the EPA and DTSC "Toxics Release Inventories".

43-14

The DEIR presents some generalized and vague information regarding the presence of heavy metals, synthetic chemicals and pathogens. The only information relative to any classification, or with any qualitative relevance, refers to "maximum reported concentrations" of three heavy metals (copper, mercury, and selenium) in excess of 503 Table 1 limits. No information is presented regarding what those concentrations were, their frequency of detection among POTWs, the percentage of sewage sludges with excessive concentrations, or duration of these excesses within POTWs. Nor is any information presented regarding heavy metal concentrations exceeding Table 1 limits which are not "maximum reported".

43-15

The other heavy metal concentration information presented regards nine of the ten subject to Table 1 limits, and refers to "average concentrations and variability". These are compared with "national averages and estimates" found in the 1990 EPA National Sewage Sludge Survey (NSSS). No quantitative information is presented regarding these concentrations or their range. Chromium is not mentioned. No information is presented regarding how heavy metal concentrations compare to, or the percentage of sludges with concentrations under or above, Table 3 limits. The DEIR statement that the "average concentrations and variability were below" those of the NSSS indicates possession of the full range of specific concentration data from which the maximum, minimum, average, percentile-based gradations and Table 1- & 3-relative values can be determined.

The NSSS presented tabulated data on a large number of heavy metals and synthetic chemicals, displaying the maximum and median concentrations, and those observed among various percentile-gradations, i.e., the concentrations found in 99%, 98%, 95%, 90% & 50% of sludges and their progressive decrease among smaller groupings. This information displays the relative quality range among varying percentages of sewage sludge in specific numerical terms. The NSSS also displays the percentage of sludges in which the metals and chemicals were detected, so that the prevalence of the pollutant is evident. The NSSS data is from 1988. [154]

Regarding synthetic chemicals, the DEIR presents no information regarding the concentrations found, their prevalence, or comparison with levels or averages reported in the NSSS. No numerical or relative terms are used in describing the presence of synthetic chemicals. The DEIR does state that "many" - "a number" are "present".

Regarding pathogens, the DEIR presents no information regarding the concentrations occurring, the quality of sewage sludges relative to the Class A & B standards, or the percentage of sewage sludges which qualify as Class A or as Class B. The DEIR does state that "sewage sludges may contain a wide variety of pathogens" "that include bacterial, viral, protozoan, fungal, and helminth pathogens".

The information presented regarding sewage sludge quality, therefore, neglects synthetic chemicals and pathogens completely, and addresses heavy metal quality only obliquely. The information presented is from CASA, which is the applicant relative to CEQA, the financier of the DEIR, and the primary economic beneficiary of this - the cheapest of all disposal methods. As aforementioned, the "1998 CASA survey data" is incomplete. The paucity of data makes it impossible to determine, or reach any conclusions regarding, whether, and what percentage of, sewage sludge currently produced meets or exceeds standards applicable to the various distribution means and application options such as EQ, PC, APLR or CPLR. No information is presented regarding the current proportions among these various means and options.

No information is presented regarding the state of quality analysis, control, pretreatment inspection, or enforcement success. Nor does it present any information regarding advancements in these areas or in treatment process technology. The DEIR does verify the importance of these matters regarding the dependence of "the risk of increased disease" on the conditional: "As long as source control programs are effective..."; and regarding the factors influencing quality: "As is the case with nutrients and trace elements, the SOC content of the biosolids is determined by the type of business and industry within the wastewater treatment service area, any onsite pretreatment conditions, and the effectiveness of the wastewater treatment process." Nor does it present any information regarding potential qualitative changes due to future trends in industrial, commercial or domestic contributions to POTW systems.

The DEIR presents information regarding sewage sludge quality that is so vague, generalized, processed, unrepresentative and insufficient that its utility, relevance and credibility are severely diminished, if not completely absent. Any substantial assessments of current sewage sludge quality, quality analysis & control effectiveness, of possible future improvements in these areas or treatment processes, or of likely future system-contribution alterations in quality are impossible with the information provided. The comparative references of three metals to one standard, and of 1998 CASA data to the 1988 NSSS data, are so selective, narrow and illusory they are as devoid of any substance as they are of relevance and function. The SWRCB should present detailed, comprehensive, independent and relevant information, as previously recommended, to enable the reader and respondent to accurately assess quality, determine factors influencing it, and comment accordingly. As it is, the DEIR fails to serve this purpose.

Regulatory Quality Incentives

CSI wrote that limits should be set for contaminant-concentration at levels which are conducive to quality improvement. That such incentives are fundamental to regulatory motives, standards and limits was demonstrated by reference to the EPA 503 rule and the GO, which state, respectively: {emphases = CSI}

"Fundamental Regulatory Principles

Control Sewage Sludge Quality

By setting limits on sewage sludge quality, this regulation creates incentives for treatment works to generate less contaminated sewage sludge. Treatment works with sewage sludge that does not meet the sludge quality conditions under the standards for a use and disposal practice must clean up the influent (e.g., strengthen the pretreatment programs), improve the treatment of sewage sludge (e.g., reduce the densities of pathogenic organisms), or select another use or disposal method.

Emphasize Waste Reduction and the Beneficial Reuse of Sewage Sludge

Achieving desired national levels of environmental quality depends on the reduction and elimination of the substantial volumes of waste and wastewater generated at home and at work. ...

EPA's policy ... of strongly supporting the beneficial reuse of sewage sludge is closely linked to its objective of reducing the volume of waste generated." [156]

"Particularly in urban areas, industrial sources discharge into wastewater collection systems. Many of these discharges are regulated by pretreatment programs implemented pursuant to Part 403 of Title 40 in the Federal Code of Regulations (40 CFR 403). These programs restrict industries from discharging toxic pollutants in amounts that can contaminate biosolids and preclude their safe use as a soil amendment." [26] or

"...Many of these discharges are regulated by pretreatment programs implemented pursuant to 40 CFR 403. ...in concentrations creating concerns for the municipal wastewater treatment facilities (treatment facilities)." [160]

That this regulatory intent is common to the federal and state standards is evident in the SWRCB's NOP re: the DEIR, among other sections of the DEIR & GO,:

"The GO is based on the Part 503 regulations" [161].

That the SWRCB has the opportunity and authority to establish such conducive contaminant-concentration limits is evident in the 503 rule:

"Clean Water Act Statutory Requirements

Section 405 (d)(5) also provides that nothing in the section is intended to waive more stringent requirements in the CWA or in any other law. This means that States and local communities remain free to impose more stringent requirements than those included in today's rule.

State Requirements

Under section 510 of the CWA, States, political subdivisions of States and interstate agencies retain the authority to adopt or enforce more stringent standards than those provided in today's part 503 regulations." [156]

CSI wrote that, "The utility and effectiveness of the regulatory impact of this GO in terms of improving the quality of municipal sewage sludge produced and land-applicable in the State must be assessed." The SWRCB was directed, as above, to the data bases from which the information necessary to the establishment of such limits can be acquired. The SWRCB was advised that the tabulation of this information, as done in the NSSS, should be presented in the DEIR so that readers and respondents could analyze the GO's incentivization effectiveness. The identification of "various percentile-rankings of contaminant concentration conducive to quality improvement and identification of the percentage of sewage sludges which would thereby qualify for land application" was advocated as a process identical to that employed by the EPA in developing the 503s.

The DEIR states that the 1998 CASA heavy metal data relative to the 1988 NSSS show that:

"average concentrations and variability were below the levels...from the...(NSSS). Average concentrations of cadmium, copper, lead, nickel, and zinc in the 1998 CASA data range from 25% to 50% of the 1990 national averages" [160]

Although too vague to produce a definitive conclusion, these statements indicate that current sewage sludge quality may be such that the 503 & GO contaminant limits, for at least the five heavy metals mentioned, based on decade-old data no longer provide quality-enhancement incentives. That the SWRCB has the access to the necessary data, and the knowledge of the procedures to use, to set quality-conducive limits pertinent to current sludge production is evident. {emphases = CSI}

"EPA set the 503 ceiling limit at the 99th percentile sludge value (i.e. 99% of the sludges in the US could meet that standard). Thus depending on what you wish to accomplish, one could set a ceiling limit based on existing sludge concentrations. There is nothing magic about what percentile is selected. EPA chose the 99th because they wanted to allow application of nearly all sludges. One might select a lower percentile in order to encourage further improvements in sludge quality." [44]

The DEIR presents no information regarding the qualitative incentives which are fundamental to the EPA 503s, the foundation of the GO. The DEIR makes no mention of the authority and freedom of the SWRCB to establish standards with effective quality inducements.

The DEIR presents no information regarding specific concentrations of any contaminants, their ranges, maximums, minimums, averages, or percentile-rankings. No information is presented in any form with which any respondent can assess this aspect of the GO, or determine the percentage of sewage sludges which may qualify for land application under various percentile-based concentration limits. The SWRCB should present detailed, comprehensive, independent and relevant information, as previously recommended, to enable the reader and respondent to assess whether and to what degree the GO provides incentives conducive to quality enhancement. As it is, the DEIR fails to serve this purpose.

Conclusion

The DEIR fails to provide sufficient, specific and credible information for assessing the quality of sewage sludge currently, and likely to be, produced in the State, or the factors or processes which have substantial effects regarding its analysis and improvement. The information presented is of no utility to any respondent in assessing current or likely future quality.

The SWRCB elected to use and present incomplete, processed and vague information regarding quality provided by CASA (the DEIR applicant, financier, policy beneficiary), simultaneously neglecting to utilize and present current and more comprehensive, detailed and independent information to which it had been referred during the scoping process.

The DEIR presents no information regarding the effect of the GO in producing incentives conducive to quality improvement. The DEIR presents no information indicating that the SWRCB intends to apply any such incentives to sewage sludge produced in California. The DEIR presents no information with which any respondent can assess the capacity of the GO to induce such incentives.

The CASA/NSSS comparative information provided, although of diminished utility, is either: irrelevant, due to the decade differential in sampling; or relevant, demonstrating diminished current regulatory incentivization.

As such, the DEIR also fails the twin objectives regarding effective policy development and public participation facilitation. With the information provided in the DEIR, it is impossible to determine anything of relevance or substance regarding either quality or incentivization. The consequences of variations and improvement in quality relative to environmental impacts cannot be assessed with the information provided. The DEIR, therefore, is unacceptable.

Due to the coincidental inclusion of useless information regarding quality, and no information regarding quality-enhancement incentivization, it can only be concluded that these selections and this negligence were intentional. It appears that the SWRCB has no interest in qualitative analysis or intent to promulgate qualitative standards conducive to its improvement. It appears that the SWRCB

has elected to adopt the EPA 503 standards, while simultaneously rejecting the fundamental principals upon which they are founded.

The SWRCB should remedy these failures.

REGULATORY ALTERNATIVE APPROACHES & METHODS / STANDARDS & LIMITS

CSI wrote that the DEIR should include an analysis of the approaches utilized by other practitioners of land application to determine how alternative methodology produces different standards and limitations regarding contaminant concentration in sewage sludge and accumulation in soil. The SWRCB was directed to various sources of information which analyze the different approaches and the resultant range in standards and limitations, with widely divergent consequences relative to environmental impacts.

In particular, attention was directed to the "metal-balance", "non-degradation", "soil-based", and "land-use multi-functionality" concepts employed in standard derivation, limit setting and impact analysis. CSI wrote that the numerical limitations of the alternative approaches and methods pertinent to sludge and soil quality should be tabulated and displayed for comparative analysis, so that the potential environmental impacts of the alternatives can be identified.

CSI also wrote, "the DEIR should include an in-depth discussion of the rationale for the selection of the regulatory approach and methodology selected by the SWRCB, and of the "relative impacts and implications" for the environment of the resultant standards and limitations. Included in this discussion should be the degree to which standards and limits are based on empirical data & scientific analysis or best judgement & policy decisions.

CSI testified at a public DEIR scoping hearing that the SWRCB was not limited to the 503, or any, risk-assessment methodology, i.e., nothing prevented it from employing any other approach. CSI remains unaware of any restriction placed on the SWRCB preventing it from analyzing, considering or adopting approaches alternative to the EPA 503 maximum-absorption-capacity approach.

Within the literature which CSI cited regarding the environmental implications of approach selection are to be found indications of the import of the differences in the various standards and limitations, and of the scope, intensity and factors of the controversy regarding the relative protectivity or environmental safety of the practice under the 503 & GO standards and limitations. Analysis of the different approaches/standards/limitations demonstrates significant environmental impact result differences, e.g.: {emphases = CSI}

"These approaches are shown to result in widely different numerical limits being set for the same constituent, which is creating unease among the regulatory authorities worldwide." [2]

"US national standards for the land application of sewage sludges are markedly less stringent than those of many other countries." [9]

"The numerical limits in this regulation are controversial, because they are several orders of magnitude higher than any country (including the United States) has ever proposed." [2]

"The cumulative pollutant loading allowed under Part 503 would result in contaminant levels approximately an order of magnitude higher than those allowed under rules in European countries (Table 6) (McGrath, et al., 1994)." [9]

"For all contaminants except lead, the US EPA "EQ" standards are significantly higher than standards for sludge products allowed elsewhere for unrestricted use. ... This policy has been criticized even by those otherwise relatively positive towards land application (National Research Council, 1996; Chaney, 1995)." [9]

"The U.S. regulations also allow the largest rate of annual input of metals to soil (Table 7) and the largest metal concentrations in sewage sludges that can be used in agriculture (Table 8). The maximum cumulative pollutant loading limits in the United States (Table 3) are the highest ever proposed for land application of sewage sludge. The unconventional loading limits have created an uneasiness among the regulatory authorities worldwide." [2]

"The risk assessment conducted by United States Environmental Protection Agency (US EPA) contains many gaps and non-conservative assumptions in establishing contaminant levels which are far less protective than those of many other nations." [9]

"The results of a risk assessment depend on the data, assumptions used, and levels of risk which are selected. Different choices will result in very different standards." [9]

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"However, the limits are higher than those which result from an apparently similar pathway analysis performed in the Netherlands which aimed to identify soils which are potentially hazardous and may require expensive clean-up measures. The fact that two risk analyses, one to establish which accumulation of metals is safe, the other to find hazardous levels disagree shows how selection and interpretation of data, coupled with the choice of which targets to protect, greatly influence environmental protection legislation in different countries." [2]

"The risk assessment for Part 503 does not set limits based on soil microorganisms (McGrath et al., 1994; US EPA, 1992)." [9]

"Why are such large disparities in the limits for different countries to be found in Tables 4, 7, and 8? The scientific approaches used by each country to develop metal input limits for applying sewage sludge to land are all conceptually valid, even though some will result in much larger degrees of environmental protection than others. The answers to this question seem largely to involve the following.

(1) Different criteria used for selection and interpretation of available data.

(2) The methods of assessing exposure. For example how large a fraction of food is assumed to originate from contaminated soil. This is particularly important for the perceived exposure to Cd.

(3) The degree of protection desired in terms of acceptable health risks and effects on the soil and other ecosystem components." [2]

"In contrast, several European countries (Sweden, Denmark, the Netherlands) use a philosophy of "do no harm" to protect soil quality. Their approach to achieving sustainability is to work towards limiting inputs to the soil so they do not exceed outputs, thus preventing accumulation of pollutants in the soil (McGrath, et al., 1994; Munters, 1997; Witter, 1996). The "do no harm" philosophy of environmental management strives to limit the addition of contaminants to the levels that are present in uncontaminated soils while recognizing the inherent uncertainty involved in risk modeling. This "no net degradation" approach is precautionary - it permits land application of inorganic contaminants only to the extent to which there will be no accumulation above levels in uncontaminated agricultural soils." [9]

"US EPA made a policy decision that a cancer risk of 1-in-10,000 was an acceptable risk resulting from sludge application. For a number of contaminants, cancer risk was determined to be the most significant risk. A cancer risk estimated to lie between 1-in-10,000 and 1-in-1,000,000 is typically used in setting regulations and in many regulatory contexts (e.g. drinking water regulation), a risk of one excess cancer in one million people exposed is used to establish the standards. Under the 503 risk assessment, policy makers elected to use the less restrictive value." [9]

"Current US federal regulations governing the land application of sewage sludges do not appear adequately protective of human health, agricultural productivity or ecological health." [9]

Regarding the "soil-based" approach and standards, CSI wrote that "the basis of this assessment should be the current concentrations of contaminants in both sewage sludge (the information for which will be available through the analysis recommended in the "Qualitative Analysis" section above), and in uncontaminated and un-sludged soils of the State. The focus of this assessment should be the relative ranking of sewage sludges and soils by percentile to identify the ranges of contamination, so that the percentage of sludges and soils falling under graded percentile-rankings (99%, 95%, 90%, 75%, etc) and within minimum, median, average and maximum ranges can be determined." CSI wrote that "The raw data and ranking results should be tabulated in an appendix of the DEIR for interested parties to examine." Among the references CSI cited with information regarding this approach is found the following: {emphases = CSI}

"Soil-based standards"

This would be an approach to regulation which sets standards based on current concentrations in background agricultural soils (uncontaminated soils). Since a range of concentrations occur naturally, such an approach selects some limit, such as the 90 or 95th percentile (meaning that 90 or 95% of the soils tested are at or below that percentile concentration) (e.g. In Table 4 in the attached Holmgren article, 95% of the US agricultural

soils have 0.78 parts per million or less of cadmium.) The standard would then allow additions to the soil (i.e. Sludges) which could raise the levels in the soil up to that 90 or 95th percentile value. It is thus a SOIL STANDARD." [44]

The availability of information necessary for formulating such a standard pertinent to, and assessing the environmental impacts of the 503s and the GO on, California soils is evident. The Calif. Department of Food & Agriculture (CDFA) is currently performing a risk assessment to set contaminant concentration limits for fertilizers and sewage sludge [159]. The CDFA was a member of the SWRCB's Technical Advisory Group (TAG) re: the GO. The background data regarding California soil concentrations utilized in the CDFA risk assessment is readily available [158]. Research to which the SWRCB was previously referred documents the post-application/tilling soil concentration increases of eight of the regulated heavy metals, minus background concentrations [2, 9]. Application of that research to current average California soil concentration data demonstrates the degree to which soil concentration of those heavy metals will be permitted to increase under the 503s & GO. The table below displays the above data and research, the resultant post-cumulative soil concentrations, and the multiples by which average California soil concentration will be permitted to increase under the 503s & GO. Thus, e.g., permitted Cadmium concentration will be 57 times average background, Copper 14 times, Lead 7 times and Mercury 32 times. The environmental implications are evident.

Heavy Metal mg/kg	Cd	Cr	Cu	Pb	Hg	Ni	Se	Zn
Calif. Soil Conc. (av) [158]	0.36	122	28.7	23.9	0.26	57	0.058	149
EPA Table 2 calc. [2, 9]	20.00	1500	750.0	150.0	8.00	210	50.000	1400
Soil Conc. + Table 2	20.36	1622	778.7	173.9	8.26	267	50.058	1549
post X pre Soil Conc. =	56.6	13.3	27.1	7.3	31.8	4.7	863.1	10.4

CSI wrote that, "The effectiveness of each of these methods in providing incentives to quality improvement should be analyzed. Information necessary for this will be available from the analysis recommended in the...section above."

CSI advocated a survey of "all ordinances adopted by California counties", "regulations adopted by other U.S. states" and "by other countries" to "identify those elements which are additional to, and more protective, restrictive, conservative, comprehensive, analytical, and inclusive of local conditions than the" 503s and the proposed GO. CSI wrote that this survey should include "all of the constituents for which all of these jurisdictions have developed standards" "regarding the concentration and accumulation of heavy metals, pathogens, synthetic chemicals, etc." CSI advocated a tabulation of the results of this survey "to display the overall regulatory scope, and to identify which jurisdictions regulate which constituents.", and that this "tabulation should provide for comparison of the EPA's 2-6-89 (proposed) with the 2-19-93 (final) 40 CFR 503 Rule".

The DEIR presents some cursory information regarding California county ordinances, the accuracy of which is called into doubt due to the inclusion of "San Luis Obispo" County among those with an "Effective Ban", i.e., one "written in a way to 'effectively' ban the land application" of sewage sludge. The fact is that this county has no regulations pertaining to land application. The descriptions presented entail mostly site restrictions and set-backs, but do include monitoring requirements for some of the synthetic chemicals, and a prohibition of Class B sewage sludge. The descriptions of the synthetic chemical monitoring, however, do not mention what is tested - sludge or soil. The environmental significance, or relative degree of protectivity, provided by these county ordinances is not addressed. The DEIR states that, "These local ordinances are important because they restrict the areas within the state that can currently accommodate land application", i.e., their impact is only significant in relation to the availability of waste discharge sites. The perspective of the DEIR applicant, financier and GO economic beneficiary (CASA) is evident, but this is an "Environmental Impact Report". The DEIR, thus, fails to provide any substantial comparative analysis of the environmental impact potential under local ordinance requirements relative to the 503s or GO.

The DEIR presents no information regarding any other approaches, standards or limits used by any other practitioners in any other states, provinces or countries. It, thus, completely omits any

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analysis of the environmental impact potential represented by adoption of alternative regulatory methodology. Among the references to which the SWRCB was directed are a number which explore the approaches and methodologies utilized by these practitioners and the relative consequential impact potential differentials. Of those, the DEIR cites one repeatedly [9] which, itself, repeatedly cites two others [2, 4] which extensively examine the differences among practitioner approaches and their environmental import. These references all include tables graphically displaying the marked differences between the 503 sludge concentration and land accumulation limits and those derived through alternative approaches and methodologies.

The DEIR presents some information regarding the "controversy" pertaining to the 503s, but these are limited to those relative to the development of the 503s (assumptions, lacking data, exclusions, site-specificity, etc.). No information is provided regarding the aspects of the controversy based on comparison with other approaches, methods, standards or limitations. These comparative analyses of the different regulatory regimes, however, are among the most important of the critiques of the relative environmental safety of the practice under the 503s and the GO. They describe the environmental impact potential consequences perhaps more distinctly than any other aspects of the controversy.

Conclusion

The DEIR fails to present any information regarding the potential environmental impacts resulting from the selection of the 503-based approach from among those available and in use. The facts that: This is fundamental to the international, national and state controversy among the scientific, agricultural and environmental communities; The SWRCB has repeatedly cited and been referred to research examining and demonstrating the environmental implications of approach-selection; and That the DEIR fails completely in mentioning or analyzing these implications; together, produce the conclusion that the SWRCB's decision to completely omit these factors is intentional. The DEIR devotes some space to presentation of some of the aspects of the controversy regarding the safety of this practice under the 503s. This, however, is limited to critiques of the processes used by the EPA in their development. The conspicuous absence of the comparative aspects of the debate is evidence of intentional neglect.

It appears that the SWRCB has no interest in considering any approach other than that embodied in the 503s, and that its neglect to acknowledge and/or analyze the environmental implications is evidence of a policy decision which has superceded its obligations under CEQA. The DEIR presents no discussion of the rationale for selection of the approach adopted.

With the information provided in the DEIR, it is impossible to determine anything of relevance or substance regarding the relative environmental impacts of the approach selected compared to the alternatives. No reader or respondent is informed that any of these alternatives exist, much less ones with vastly different environmental implications. As such, the DEIR also fails the twin objectives regarding effective policy development and public participation facilitation. The DEIR is, therefore, unacceptable.

The SWRCB should present detailed, comprehensive and relevant information, as previously recommended, to enable the reader and respondent to assess the environmental impacts of the decision it has made relative to the alternatives. The SWRCB should remedy these failures. Any decision not to do so can only be considered a further evasion of its responsibility under CEQA, and an abrogation of its obligation to the public and those potentially effected by its policy decisions.

IMPACT DATA - BASE / COMPLIANCE - ENFORCEMENT HISTORY - RECORDS

CSI wrote that the DEIR should analyze the "degree to which permitting/regulating agencies are capable of determining impacts of land application", and the "effectiveness of enforcement and compliance regimes". The DEIR could, thereby, provide readers and respondents with information indicating the adequacy or inadequacy of the current regulatory framework with respect to identifying and quantifying impacts and providing effective oversight "regarding both generation and application".

CSI advocated the examination of "all Monitoring and Reporting Programs (MRPs)", "all pre-application background analyses of soil, surface water, groundwater, air and crops", "all sludge sampling and cumulative analyses performed", and "the results of all monitoring data". The DEIR

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Conclusion

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could, thereby, present this information and that regarding whether pre-application background analyses and post-application monitoring were required, including the parameters and pathways analyzed.

CSI advocated the examination of the "history of regulatory compliance of generators, haulers, applicators and recipients". The DEIR could, thereby, present information regarding incidents of excessive pollutant concentration at POTWs "indicative of industrial contamination", and regarding the "effectiveness of POTWs in identifying and quantifying them" and in pursuing "enforcement actions". It could also, thereby, present information regarding "incidents of permit, WDR & MRP violations, and enforcement actions taken, permit revocations, cease and desist orders, and fines levied" pertinent to applicators/dischargers.

CSI also wrote that it had been informed that the SWRCB maintains no centralized records regarding either impact identification or oversight effectiveness. CSI was informed that this information is maintained by the RWQCBs and local permitting agencies. CSI advocated that centralized record-keeping be initiated so that a comprehensive and current record is available with which to assess the "relative environmental protectiveness" of the current regulatory regime.

The DEIR presents some information regarding the importance of the adequacy of background condition analysis and post-application monitoring and compliance:

"There is no requirement to characterize soil conditions at a proposed biosolids application site for fertility, erosion hazard, or heavy metal-attenuating capability; track actual bioavailable heavy metals concentrations in the soils; or manage the soils to reduce phytotoxicity problems." [4-8]

"The current GO and Part 503 regulations do not require specific consideration of bioavailable metals concentrations, irrigation and cropping practices that can affect bioavailability, or bioaccumulation factors and mobility when determining biosolids application rates." [D-22]

"Many argue that...there is not an adequate system to monitor long-term cumulative increases in soil contaminants that could contribute to bioaccumulation in plants and animals and that cumulative impacts could therefore occur over time as soil levels of contaminants build up." [5-30]

"Members of the public and agency staff indicated that both funds and staffing resources would be needed for the RWQCBs to adequately administer this additional regulatory program. Much of the public concern regarding the viability of the GO has related to its reliance on strong monitoring and enforcement actions." [ES-16]

The DEIR presents no information regarding the current capacity of POTWs to identify and quantify influent contamination or to pursue their source and obtain effective enforcement actions. The DEIR presents no information regarding the current capability of responsible agencies to identify and assess the environmental impacts of activities they permit, whether through background analysis or post-application monitoring. The DEIR presents no information regarding the current effectiveness of enforcement actions taken against any parties to ensure compliance.

The DEIR fails to present information regarding the degree to which agencies are capable of identifying and quantifying impacts and ensuring compliance. The DEIR fails to mention the current and/or historical methods employed by RWQCBs in these areas, or their effectiveness. The DEIR fails, i.e., to provide any information regarding what environmental impacts have occurred to date, what analytical techniques have been employed to detect them, their effectiveness, and what oversight interventions have been required and determined effective in environmental protection. With the absence of information presented, it is impossible for any reader or respondent to evaluate or comment on the effectiveness of pretreatment programs, environmental impact assessment or oversight activities. It is also impossible to assess whether, or how, the GO will contribute to, or detract from, environmental protection relative to the present regulatory regime. As such, the DEIR also fails the twin objectives regarding effective policy development and public participation facilitation. The DEIR is, therefore, unacceptable.

The SWRCB appears to have no intent to improve the state of its record-keeping by centralizing data regarding pretreatment, environmental assessment and monitoring, and regulatory compliance to provide the agency and public with a comprehensive and current overview of the effectiveness of its programs.

In light of the fact that the DEIR acknowledges the importance of these matters, neglects to analyze or report about them, and gives no indication that the SWRCB intends to monitor its own regulatory activities, it can only be concluded that the perpetuation of this negligence is intentional. The SWRCB should remedy these failures in the manner previously indicated.

DEMONSTRATIVE EXCLUSIONS / INCLUSIONS

CSI includes herein two entries demonstrative of the SWRCB's deliberate selectivity and misrepresentation as made evident by information included and excluded from the DEIR. The two DEIR citations addressed herein indicate manipulation of information performed in a manner identical to the methods employed by the national/state waste-disposal industry/sewage-plant public-relations/lobbying organs. The parallels between the Draft EIR & GO and the printed propaganda materials distributed by those organs promoting land application is demonstrated by exposition of the references both make to the National Research Council (NRC) 1996 report and the Ohio 1985 farm study.

Materials distributed by Waste Management, Inc. (WMX) produced by the national Water Environment Federation (WEF), whose California affiliates are the Water Environment Association (WEA) and CASA (DEIR financier, applicant and GO economic beneficiary), are compared to information included in the DEIR & Draft GO, and to the actual NRC and Ohio farm study reports. It is evident that the inclusions and exclusions used by the sewage-plant/waste-disposal public-relations/lobbying organs (WEF & WEA/CASA) are replicated by the SWRCB in the DEIR & GO.

It is apparent that the obvious bias, simultaneously utilized by the industry and the agency purportedly regulating it, infects the primary purpose of the GO as represented in Finding #1: "This General Order assists in streamlining the regulatory process for such discharges." As if to emphasize the selectivity employed by the SWRCB, the DEIR description of the Technical Advisory Group (TAG) participants omits mention of WMX, WEA & CASA by name, yet includes, by name, a number of environmental organizations ("special interest groups") a number of which never attended any TAG meetings. This misrepresentation is apparently intended to impress the reader that a balance of "interests" had influence on the pre-DEIR process.

The parallels identified in the following expositions leave little doubt that the exclusions and inclusions are deliberately designed to serve a single purpose.

NRC 1996 REPORT

CSI wrote that the Draft GO stated that the NRC "committee made some recommendations for improvement...", without specifying what those recommendations were. CSI cited some NRC critiques and recommendations and wrote that the DEIR should address them.

The following inclusions from WMX/WEF material and the DEIR & GO demonstrate that both make reference to the positive findings of the report. {emphases = CSI}

WMX/WEF Material

"In a recent independent review of all the research data and the risk assessment methodologies used to develop Part 503, the National Research Council (NRC), an arm of the National Academy of Sciences, found there to be no reported outbreaks of infectious disease associated with a population's exposure - either directly or through food consumption pathways - to adequately treated and properly land applied biosolids." [162. a]

"The National Research Council's review of the Part 503 rules took issue with only one aspect of the regulations pertaining to the survival of tapeworms in Class B biosolids applied to cattle grazing areas. The council concluded that U.S. EPA's Part 503 rule appears to be adequate for the protection of the public from the transmission of waste associated pathogens." [162. b]

DEIR

"The panel noted, 'There have been no reported outbreaks of infectious disease associated with a population's exposure - either directly or through food consumption pathways - to adequately treated and properly distributed reclaimed water or sludge applied to agricultural land.'" [160: 5-26]

"10. The National Research Council established a committee to review the methods and procedures used by the U.S. EPA while forming the basis of the 40 CFR 503. ... After a three-year study (starting in 1993), the committee made some recommendations for improvement but also stated: 'Established numerical limits on concentration levels of pollutants added to cropland by sludge are adequate to assure the safety of crops produced for human consumption.'" [160: Appendix A. Draft Text of the General Order. Finding #10]

The following inclusions from the DEIR demonstrate recognition of three NRC recommendations re: pathogen monitoring, animal grazing restrictions and toxics testing. Also included are the SWRCB responses re: toxics monitoring, Class A pathogen definition and grazing restrictions. The Draft GO states that, "As a result of the peer review ... fecal coliform testing ... for determining Class A ... is included". As is evident, the 503s allow the use of either fecal coliform or *Salmonella* for Class A definition, and this choice is "incorporated with no changes" in the GO. Any interpretation that an addition has occurred would be false. One particular type of grazing is subject to a restriction beyond that of the 503s. {emphases = CSI}

"The National Research Council in 1996 assembled a panel of experts to assess the issue. The panel concluded that continued research on pathogen-monitoring techniques was needed, that restrictions on animals grazing on biosolids-amended fields should be reevaluated, and that the testing of sludges for the presence of toxics should continue so that the risk assessment assumptions can be refined as needed as better data become available (National Academy of Sciences 1996)." [160: 5-2]

"As a result of the peer review, monitoring for organic chemicals and using fecal coliform testing as a parameter for determining Class A level pathogen reductions is included in this General Order." [160: Appendix A. Draft Text of the General Order. Finding #10]

"Federal Requirements

Pathogen Reduction

2. Class A biosolids must be monitored for bacteria regrowth at the time of usage or disposal. Fecal coliform density must be less than 1,000 Most Probable Number (MPN) per gram of total dry solids (1,000 MPN/g TS) or Salmonella sp. density less than 3 MPN per 4 grams of total dry solids (3MPN/4g TS).

State Requirements

Pathogens:

1. Both the Class A and Class B definitions are incorporated with no changes." [160: Appendix C. Existing Regulatory Programs for Biosolids Land Application:]

"7. Biosolids distinguished as "Class B" in 40CFR 503 must comply with the following:
b. (2) For at least 12 months:

(c) Grazing of milking animals used for producing unpasteurized milk for human consumption is prevented if the field is used as pasture." [160: Appendix A. Draft Text of the General Order. B. Discharge Specifications]

NRC Report

The following are recommendations and a "farmer's perspective" from the NRC Report. All of these are consistently omitted from WMX/WEF materials. They are also omitted, in whole or part, from the DEIR & GO. The recommendations have all been ignored by the SWRCB and are not included in the Draft GO, except for partial inclusion in two areas.

• Recommendation Excluded & Ignored

The NRC stated that the test for salmonella should "not [be] substituted for the fecal coliform test" in Class A definition. This recommendation has been excluded from the DEIR and ignored in

the GO, which continues to permit the use of the salmonella test as a substitute for the fecal coliform test (see "Federal & State Requirements", above). {emphases = CSI}

"Recommendations

Until a more sensitive method for the detection of salmonella in sludge is developed, the present test should be used for support documentation, but not substituted for the fecal coliform test in evaluating sludge as Class A." [38]

• Recommendation Excluded & Ignored

The NRC stated that the distribution of sewage sludge to the general public under the 503 Table 4. "Annual Pollutant Loading Rate" (APLR: 503 Table 1., Class A) method should be discontinued. It stated that only sewage sludge qualifying as "EQ" (503 Table 3., Class A) should be so distributed. This recommendation has been excluded from the DEIR and ignored in the GO, which continues to permit such distribution of sewage sludge with the highest allowable (503 Table 1.) heavy metal levels. {emphases = CSI}

"Recommendations

The Part 503 Sludge Rule should be amended to more fully assure that only sludge of exceptional quality, in terms of both pathogen and chemical limits, is marketed to the general public so that further regulation and management beyond the point of sale or give-away would not be necessary." [38]

• Recommendation Excluded & Ignored in part

The NRC stated that synthetic chemicals should not be exempted from regulation due to their prohibition from manufacture. This recommendation has been excluded from the DEIR and only partially included in the GO. The NRC cited the three exclusionary justifications used by the EPA regarding synthetic chemicals, and listed six which violated the EPA's criteria. The GO requires the testing of sewage sludge for two of these, but does not regulate any with concentration or cumulative standards. {emphases = CSI}

"Recommendations

The EPA should not exclude chemicals from regulatory consideration based solely on whether or not those chemicals have been banned from manufacture in the United States (e.g. PCBs) since they are still found in sludges from many wastewater treatment plants." [38]

• Recommendation Ignored in part

The NRC stated that the 1 month grazing delay should be re-evaluated. The DEIR mentions this recommendation, but the GO amends this delay pertinent to only one type of animal producing only one type of drink for use by one type of consumer (see "Discharge Specification" #7, above). {emphases = CSI}

"Recommendations

EPA should re-evaluate the adequacy of the 30-day waiting period following the application of Class B sludge to pastures used for grazing animals." [38]

• Farmer's Perspective Excluded & Ignored in part

The NRC stated that variations in industrial contributions, treatment processes and water content produce variations in heavy metal and nutrient concentration which make sewage sludge "more difficult to use than chemical fertilizers." This "farmer's perspective" is excluded from the DEIR. {emphases = CSI}

"Use of Sewage Sludge in Agriculture

From the farmer's perspective, other factors limit agriculture use of sewage sludge. Sewage sludge is inherently more difficult to use than chemical fertilizers. In part, this is because the composition of plant nutrients and trace elements vary due to differences among types of sludges (e.g., different water contents or treatment processes) and differences among municipalities and their industrial contributors. The composition of commercial fertilizers are formulated to meet crop requirements." [38]

Finding #7 of the GO, however, lists a number of characteristics of sewage sludge "beneficial to agriculture", among which are: "nitrogen" ("immediately available" & "released slowly"),

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"phosphorus", "micronutrients", "enhancing soil structure", "increasing water retention", "promoting soil aggregation", "reducing bulk density", "maintaining an aerobic environment within the plant root zone" and "water retention". Finding #8 mentions some "problems" which can occur, none of which include a "farmer's perspective" regarding the differences between sewage sludge and fertilizers.

OHIO 1985 FARM STUDY

Both WMX/WEF materials and the SWRCB's DEIR refer to a 1985 study of farms in Ohio and cite its findings as relevant to other areas, this state and this DEIR. The degree of deliberate misrepresentation, duplicitous selectivity and blatant manipulation exemplified by this erroneous exploitation of "epidemiological" data is understandable when employed as a propaganda tool by those with monetary interests. When the agency, purportedly regulating the activity from a "science-based" perspective, however, resorts to the same means, serious questions arise regarding its use of scientific research, objectivity, credibility and responsibility. Doubts about bias could become exacerbated and synergistic, especially if combined with previous or subsequent indicators of such an inclination.

Warning: Do Not Generalize

The Ohio farm study Report (Report) begins and ends with the same sentence - a precautionary warning against its misuse by inferring its general pertinence. The Report specifically advises that extrapolating beyond a very narrow set of circumstances cannot be supported. {emphases = CSI}

"Caution should be exercised in using these data to predict health risks associated with sludges containing higher levels of disease agents and with higher sludge application rates and larger acreages treated per farm than used in this study." [163]

Nevertheless, both the industry and the SWRCB, to its discredit, employ it to fabricate irrelevant and insubstantial implications, in direct violation of the report's advisory. Both repeat the findings of the Report. The DEIR distorts the Report's relevance by citing it in reference to exposure to synthetic chemicals, none of which were studied. {emphases = CSI}

Report

"The estimated risks of respiratory illness, digestive illness, or general symptoms were not significantly different between sludge farm and control farm residents. Similarly, there were no observed differences between disease occurrence in domestic animals on sludge and on control farms." [163]

WMX/WEF Material

"In addition to this empirical evidence, a three-year study was completed by the Ohio Farm Bureau in 1984. The study compared the health effects of residents living on farms using biosolids with those on control farms and found no difference in the health status between the two groups." [162. a]

DEIR

"Direct Contact with Pathogenic Organisms

The study found no differences in human or animal health effects. The estimated risks of respiratory illness, digestive illness, and general symptoms were not significantly different between the residents of the farms receiving sludge applications and the residents of the control farms. There were no observed differences in occurrence of diseases in domestic animals between the two groups of farms." [160: 5-27]

"Organic Compounds in Food, Soils, Animals, Dairy Products, or Wildlife

The epidemiologic study of human exposure on 47 farms in Ohio to biosolids showed no significant differences in health that could be related to biosolids land application, including health effects that could be related to the presence of SOCs in biosolids (Dorn et al. 1985 and National Academy of Sciences 1996)." [160: 5-33]

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The Report reveals the reasons it warned against comparisons to higher pathogen content, application rate and acreage conditions as inconclusive. The study involved a small number of farms, people and animals, at low application rates, on small plots. The Report states that its findings were effected by these factors. The DEIR, however, excludes these inconvenient facts and avers that they "generally apply" to California. {emphases = CSI}

13 Farms - 28% of Original Finish Study

Report

As the text and table from the Report demonstrate, the 3-year findings are based on sewage sludge application to 13 farms, and only 28% - 30.5% of the original farms and people:

- Of the 93 farms beginning the 3-year study (47 sludged + 46 control):
- **28% finished 3 years** (13 sludged + 13 control).
- Of the 295 people beginning the 3-year study (165 sludged + 130 control):
- **30.5% finished 3 years** (53 sludged + 37 control).

"Thirty-six sludge farms completed 2 years and 13 completed 3 years. Thirty-seven control farms completed 2 years and 13 completed 3 years." [163]

"Numbers of Farms and Participants in Sludge and Control Groups by Years of Participation

Unit	Study Group	Number started	Number Participating		
			1 year	2 years	3 years
Farms	Sludge	47	47	36	13
	Control	46	46	37	13
Participants	Sludge	165	165	126	53
	Control	130	130	109	37

DEIR

The facts that 72% of the farms and 70% of the people did not finish the study are omitted from the DEIR. The implication is that this "extensive study" covers 93 farms and "all the participants". {emphases = CSI}

"Incidental human contact and farmworker and family contact with biosolids were evaluated in an extensive study reported by Dorn et al. (1985). The 3-year study covered three geographical areas in Ohio and included 47 farms (164 persons in 78 families were evaluated) receiving annual applications of treated sludge (average of 2-10 dry metric tons/hectare/year; average of 20-29 wet tons per acres per year at 25% solids). These were compared with 46 control farms (130 persons from 53 families). All the participants completed monthly questionnaires concerning their health and their animals' health, underwent annual tuberculin testing, and provided quarterly blood samples for serological testing." [160: 5-26, 27]

3 - 15% California Rate + 40-120 Acre Plots = Inconclusive + Inapplicable

Report

The annual application rates and sizes of plots were very small. This accounts for the findings of "no observed differences" regarding both human and animal health. {emphases = CSI}

Of the average California application rates (30 tons/acre/year), those in the study amount to:

- 3% of the rate in California (2.0 MT/ha/yr = 0.9 Tons/acre/yr)
- 6.7% of the rate in California (4.5 MT/ha/yr = 2.0 Tons/acre/yr)
- 15% of the rate in California (9.9 MT/ha/yr = 4.5 Tons/acre/yr)

"The means (and ranges) of application rates were 2.0 (1.3 - 4.8), 4.5 (3.2 - 7.0), and 9.9 (4.0 - 12.1) dry metric tons/ha/year..." [163]

The average acreage to which sewage sludge was applied in the study were:

- 37 acres [15 ha = 37 acres]
- 116 acres [47 ha = 116 acres]

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"Applications were ... (mean 15 ha) and ... (mean 47 ha)." [163]

The low application rates and small numbers of farms, people and animals studied reduce its conclusiveness and applicability elsewhere: {emphases = CSI}

"The absence of observed human health or animal health effects resulting from sludge application in this study of Ohio farms was associated with low sludge application rates..." [163]

"The small number of participating farms and persons completing 2 and 3 years is due primarily to late start up times and voluntary withdrawal from the study." [163]

"The animal health analysis was somewhat restricted by the small numbers of animal units and animals ... It should be pointed out, however, the small sample size and large variances would hinder obtaining a statistically significant result if, in fact there is an association between sludge exposure and illness among farm animals." [163]

DEIR

The DEIR excludes any mention of these qualifications contained in the Report, asserts that it is representative of "typical" California land application, and that its findings can be generalized to the State. Yet, the California Farm Bureau Federation (CFBF) informed the SWRCB in May 1998 that California application rates are from 6.7 to 33 times those of the Ohio study. {emphases = CSI}

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"The sludge application rates on the Ohio farms in the study were consistent with typical application rates for agricultural uses in California; therefore, the results of the study generally apply to land application of biosolids under the GO." [5-27]

CFBF

"Yet we know that sewage sludge applications in California often are in the range of 20-40 tons/acre per application, if not more (and there may be more than one application per year)." [26. b]

ONLY Report re: Health Impacts - Safety in Doubt / yet Asserted Conclusive

This Report is the only systematic epidemiological analysis of the human or animal health effects of sewage sludge land application. None had been conducted before, and none since. Unknowns still exist regarding the impacts. Despite its warnings regarding its inconclusivity and the irrelevance of generalizations based upon it, both the waste-disposal industry and the SWRCB, in unison, persist in perpetuating them, as instrumental to their assertions that no further study is warranted. The DEIR identifies money as an impediment to empirical examination. {emphases = CSI}

Report

"Municipal sewage sludge has been applied to farmland for many years, however, there remain questions about the human health and animal health consequences of this practice." [163]

"There have been no previously reported studies of the human health effect of land application of treated municipal sewage sludge." [163]

"Since no systematic investigation of human and livestock health effects of sewage sludge application on privately owned farms has been conducted, the study described in this report was initiated." [163]

"Since this is the only study of a human population exposed to municipal sewage sludge that has been conducted to date, it is not possible to directly compare these results with those of other studies of health effects of sludge application on farmland." [163]

WMX/WEF Material

"Because the scientific and medical community have not encountered any incidents which would suggest a potential problem with biosolids land application, further epidemiological surveys have not been conducted." [162. a]

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DEIR

"No subsequent studies have been performed because the risks were deemed to be low and the costs for such studies are very high." [5-27]

IMPACTS / CONTROVERSY

The DEIR identifies a number of potential environmental impacts and concludes that all are either "less than significant" or "mitigated" thereto. The DEIR also identifies a number of aspects of the controversy regarding the safety of this practice under the EPA 503s and the GO, which is essentially identical. Although illustrative, these presentations consistently omit information which would demonstrate the significance of the relationship between the controversy and the potentiality of impacts. The significance is that numerous aspects of the controversy indicate that impacts are greater than assumed and asserted, and that inadequate safety is provided under current and proposed federal and state regulations, and GO "mitigation measures". These omissions and exclusions thereby render these presentations relatively devoid of value, yet appear consistent with those identified in above sections of these comments, and are as apparently deliberate.

The DEIR fails to provide sufficient information to the reader and respondent to accurately assess the potential impacts and non-protective aspects of the regulations which call into question its conclusions. As such, the DEIR also fails the twin objectives regarding effective policy development and public participation facilitation. The DEIR is, thus, unacceptable. The SWRCB should remedy these failures.

CSI has compiled a three-part presentation from the references listed in these comments and submits them herewith as an addendum. These are composed primarily of excerpts from those references, accompanied by summaries regarding their import and relationship to other factors. They are titled "Impacts", "Regulatory Safety" and "Recommendations" and address categorized areas of potential impacts by contaminant and pathway, areas of controversy by aspect of debate, and recommendations regarding overall standards and project-specific considerations. CSI considers this presentation, and its submission, as an adequate exposition of potential and unmitigated impacts, factors indicating enhanced potentiality of impacts under the 503s & GO, and suggestions for adequate mitigation and regulation. The table of contents of these three parts (Addendum #1) is presented below.

Included within this addendum the reader will find the two following examples demonstrating the above comment that the DEIR fails to explain the significance of some of its entries. It will also be noted that a number of the research documents are among those the DEIR cites, indicating an intentional exclusion of information.

The DEIR mentions soil microorganisms, but neglects to point out that the EPA failed to consider them in the 503 risk-assessments. The CSI references show that failure, as well as the facts that impacts may occur at sub-503 heavy-metal levels, another practitioner's inclusive risk-assessment approach produces lower limits, and that this neglect contributes to the controversy.

DEIR

"Within Title 22 limits, high levels of SOCs ...are still permitted in biosolids, adversely affecting populations of beneficial soil microorganisms...." (4-10)

"Some evidence indicates that the rate of decomposition of organic matter by microorganisms may be reduced in the presence of high concentrations of heavy metals." (3-3)

Ref's

"...the regulation failed to take soil microorganisms into consideration because of a lack of information on the toxicity to soil biota." [2]

"...these metals [Cu, Ni] may nevertheless inhibit microbial activity and plant growth at soil concentrations below those permitted by the USEPA-503 regulations." [4]

"...the Dutch...and the U.S. EPA regulations...share a common approach based on pathway analysis. ...the Dutch ecotoxicological C-values are based on the metal toxicity effects of all the metals in Table 4 on a range of soil organisms...." [2]

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"However, the limits are higher than those which result from an apparently similar pathway analysis performed in the Netherlands.... The fact that two risk analyses ...disagree shows how ...the choice of which targets to protect, greatly influence environmental protection legislation in different countries." [2]

"These approaches are shown to result in widely different numerical limits being set for the same constituent, which is creating unease among the regulatory authorities worldwide." [2]

The DEIR mentions synergistic effects of simultaneous multiple-contaminant exposure as a "general concern" re: "oversight", but neglects to point out that the EPA failed to consider them in the 503 risk-assessments. CSI references show that failure, as well as the facts that impacts may occur at sub-503 heavy-metal levels, those limits may be too high, and that this neglect contributes to the controversy and calls to lower the limits.

DEIR

"There is also general concern regarding the potential oversight of the Part 503 regulation in not accounting for synergistic or combined risks from exposure to multiple constituents that may be present in biosolids." (6-28)

"Synergistic toxicity effects between heavy metals may also occur, making impacts additive in some cases." [4-7]

Ref's

"After identifying the pollutants to be considered the rulemakers then considered them one by one." [17. a]

"Similarly, the risk assessment did not attempt to address the ways in which the effects of exposure to multiple chemicals simultaneously can affect the toxicity impacts." [9]

"Nor do the EPA analyses consider the consequences of interactions between inorganic and organic pollutants." [17. a]

"We have shown many times with soil that combinations of heavy metals can devastate plant growth. ... Over a period of several years we made studies of multiple-element toxicities of plants grown in solution and in soil and observed profound interactions which cast some doubt on the validity on some of the conclusions of EPA Rule Part 503...." [11]

"The 503 rules thus allow the concentration of pollutants in sludge to be a factor of 4 or 5 times the amount prescribed under the criteria of maximum usable with no toxic effects when pollutants are considered individually." [17. a]

"The permissible levels of heavy metals may be too high, however, because EPA obviously did not fully consider the interactions which occur when 2-3-4-5 or more heavy metals are at high levels simultaneously especially after 40 years of use when decomposition releases some of the heavy metals." [11]

"For this reason, there has been debate about the extent to which the phytotoxic effects of metals such as Zn, Cu, and Ni are additive and whether individual metal limits should be lowered to reflect this additivity (Sanders et al., 1986; Davis and Carlton-Smith, 1984)." [4]

Thank You;

David E. Broadwater
David E. Broadwater, CSI Director

43-58
(cont)

43-59

Addendum # 1
CSI Submission re:
Impacts, Regulatory Safety, Recommendations

IMPACTS

Heavy Metals
Synthetic Chemicals
Pathogens
Soil
Wildlife
Plant/Crop
Food Chain
 Animal
 Human
Groundwater
Surfacewater
Air

Agricultural/Land Use : Ecological/Economic

REGULATORY SAFETY: Debate & Doubt

Practitioner Approach, Standards, Limits: Comparison

Fraction Regulated

Long-Term Impacts Not Analyzed

Synergistic Impacts Not Analyzed

Multi-Pathway Exposure Not Analyzed

Variety of Plant & Soil Impacts Not Analyzed

Synthetic Chemicals Excluded

Pathogen Content & Impacts Not Analyzed

Radioactivity Omitted

"EQ" Sewage Sludge Excluded

Heavy Metal Long-Term Impacts: Substitution of Assumption for Knowledge

Ecological Impacts-Wildlife & Soil Organisms: Substitution of Assumption for Knowledge

Plant/Crop Impacts: Substitution of Assumption for Knowledge

Plant/Crop Sensitivity & Yield Reduction: Data from heavy-metal-tolerant crop and 50%-acceptable-production loss used to assess risks

Food Chain Impacts: Substitution of Assumption for Knowledge

Groundwater Impacts: Substitution of Assumption for Knowledge

Cancer Risk: Increased by 100

Oversight/Compliance: Lack of Federal, State, Regional and Local Enforcement & Coordination

RECOMMENDATIONS

Additional Research

Human Food and Animal Feed Crop Prohibition

EQ - Regulate, APLR - Eliminate

Pretreatment Improvement

Soil - Based Standards

Test Sludge for More Pollutants, Disclose More Information, Label Products & Inform Future Owners

Lower Cancer Risk Factor

Lower Heavy Metal Standards

Regulate Synthetic Chemicals

Improve & Expand Pathogen Testing

Soil Sampling:

 Background

 Post-Application

Agronomic Rate Calculations

Crop and Grazing Restrictions

Water: Ground & Surface

Farmers and Farm Workers

Legal & Economic Liability and Credit & Marketing Risks

Addendum # 2
CSI 11-30-98 Scoping Comment Sections Included in DEIR Comments by Reference and Addendum
CONTEXT, GENERAL, SPECIFIC SECTIONS

CONTEXT

Jurisdiction / Enforcement / Compliance

Land Use & Agricultural Variability over Time

GENERAL

Enforcement / Compliance Authority

Scientific/Empirical Data Enhancement Permitting Process

Local Condition, Agency, Public Inclusion / Notification

Record-Keeping & Distribution for Full Disclosure / Informed Consent / Labeling

Economic Impacts with Potential Environmental Ramifications

CCDEH Restriction re: Feed & Food Crops

Waivers / Exemptions / E.O. Discretion

Name/Title "Biosolids/Sewage Sludge"

Worker Protection

Data Base: Inclusion

Data Base: Revelation

SPECIFIC SECTIONS

Findings

Finding #1: b. & c., & 2. Re: EQ

Finding #3: Definition of Sewage Sludge

Finding #5: Pretreatment Programs

Finding #6: Post-Treatment Persistence of Contaminants

Finding #7: Benefits - Economic Incentives

Finding #8: Problems

Finding #11: 40 CFR 503 Compliance/Enforcement

Finding #12: 40 Acre Categorization

Finding #15: Local Regulation/GO non-issuance

Finding #17: Local Permit Responsibility

Finding #18: Exclusion of "Unique and Valuable Public Resources"

Finding #19: "Non-hazardous decomposable" Exemption

Finding #20: Storage Exemption

Finding #23: Public Notification & Hearing re: GWDRs

Prohibitions

Prohibition #1: Waiver

Prohibition #6: Surface Water Runoff

Prohibitions #7 & 8: Exemption of Rate Excessive of Agronomic Requirements

Prohibition #11: "Pollutant" Concentrations

Prohibition #13: Wind

Prohibition #15: Food & Feed Crops

Prohibition #16: Proposition 65 Inclusion

Discharge Specifications

1.: Pathogen Reduction

4.: Cumulative Loadings

8.: Class B Restrictions

9.: Set-Backs

Storage & Transportation

Provisions

3. Notification

9. Liability/Enforcement

16. Laboratory Waiver

17. Non-Compliance Report Waiver

18. Monitoring Records Maintenance

Monitoring & Reporting Program (MRP)

Pre-Application Report

2. Source

3. Constituent Concentrations
4. Application Area Information
5. Ground Water Monitoring
6. Storage Plan
8. Spill Response and Traffic Plan

Semi-Annual Reporting

1. Groundwater Monitoring
3. Pollutant Loadings

General Reporting

1. Pre-Application Report Submission
2. Laboratory Waiver
9. Crop Analysis/Labeling

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Responses to Comments from Center for Sludge Information (CSI)

- 43-1. SWRCB staff notes the commenter's opinion regarding the adequacy of the draft EIR and does not agree that the document is "substantially deficient". CSI's comments during the scoping process were reviewed and considered during preparation of the draft EIR. Documents referred to in these scoping comments were also reviewed as needed to understand CSI's concerns. Individual CSI comments are responded to below.
- 43-2. See Responses to Comments 37-2 and 37-3, and Master Response 12.
- 43-3. The CASA sewage sludge information was not forwarded because it was in preliminary form in fall 1999. These data have recently been compiled into a document entitled "1999 Update, Biosolids Management Practices Survey in the State of California" and is available from CASA. It was issued in December 1999.
- 43-4. The information in the draft EIR regarding past and current generation of biosolids was developed primarily from 1998 CASA data. Where necessary, this information was supplemented to be as all inclusive as possible, with information from POTW biosolids annual reports submitted to EPA. Therefore, the citation for Figure 2-2 has been revised as follows:

California Association of Sanitation Agencies 1999; Fondahl, Brisco, and Thurber pers. comms.

The use of EPA data to support the CASA data findings was not properly referenced in the draft EIR. SWRCB staff believes that the CASA and EPA data represent the best available information on biosolids generation. SWRCB staff also believe that using anticipated population increases to project future biosolids generation rates effectively estimates future trends. Other minor factors, such as urbanization of rural areas and increased industrialization, are expected to be within the margin of accuracy needed to predict impacts of implementing the GO.

Identifying biosolids generation by individual county or treatment works would not be useful in determining the impacts of implementing the GO. Impacts are related to the quality, volume, and application techniques of biosolids under the environmental conditions that exist throughout the state. If the commenter is interested in generation data from individual treatment works, please contact CASA for its 1998 biosolids generation database.

- 43-5. Because this EIR is programmatic and not intended to analyze conditions at each existing or proposed land application site, each of these locations has not been identified in the EIR. Also, it is not within the scope of this CEQA analysis to describe and analyze the regulatory and economic factors that are taken into account by each treatment plant operator when decisions are made regarding reuse or disposal of biosolids. The EIR has identified recent

trends in disposal and reuse, which are indicative of the regulatory and economic conditions surrounding biosolids, and projected these trends by assuming these conditions do not change substantially. The environmental and regulatory issues surrounding other biosolids disposal options (incineration, landfilling) are discussed in Chapter 14's land application ban alternative. It is considered speculative at this time to predict major changes in the trends of biosolids disposal and reuse in the state.

- 43-6. See Responses to Comments 43-4 and 43-5.
- 43-7. The relative cost factors for selection between the biosolids reuse or disposal options undoubtedly vary significantly from one treatment facility to another. Therefore, a generalization in this area was not made; also, the economic drivers for reuse are not relevant to the impact analysis. The impacts occur primarily in isolation at each land application site, so the overall, statewide volume of material going to land application is not a significant factor in the analysis.
- 43-8. As indicated in responses above, the SWRCB has prepared a programmatic impact evaluation, in consideration of the nature of the project (adoption of a statewide regulation). As such, the impact evaluation is not site specific. Providing site-specific information on existing land application operations was not deemed integral to evaluating the programmatic environmental effects of implementing the GO.
- 43-9. The SWRCB respectfully disagrees with the commenter regarding the acceptability of the EIR's impact analysis. The depiction of the future condition surrounding land application of biosolids in California, as presented in the draft EIR, is considered credible and specific enough to provide a programmatic impact analysis.
- 43-10. See Response to Comment 43-4.
- 43-11. The GO lists the minimum quality of biosolids for application. Impacts from using that quality of material are evaluated. Accordingly, information detailing the sludge and biosolids quality for every POTW in California does not assist the state in assessing environmental impacts and is therefore unnecessary.
- 43-12. The draft EIR identifies the proposed discretionary action's potential environmental impacts. All constituents in biosolids that could affect the environment are addressed in the draft EIR. Other constituents, to the best of current knowledge, have not been shown to pose an impact. The comment does not support the allegation that information has been omitted from the draft EIR.
- 43-13. See Responses to Comments 43-11 and 43-12.
- 43-14. See Responses to Comments 43-11 and 43-12.

- 43-15. The discussion of the quality characteristics of biosolids generated in California was based on survey responses voluntarily provided to the California Association of Sanitation Agencies (CASA). Although the results do generally indicate that the median concentrations of trace metals are less than the national average as measured for the 1990 National Sewage Sludge Survey (NSSS), the study results are not considered equivalent to the NSSS findings. The NSSS was a rigorous, statistically based survey, whereas the CASA survey is considered for informational purposes only. The CASA results were not described in more detail for the reasons above and because each individual biosolids application project that would be conducted under the GO would have to provide test results of contaminant concentrations in the biosolids to be applied and background levels in the soil in the preapplication report. Therefore, the RWQCB staff would make site-specific assessments of each application project to ensure that the application project complies with provisions of the GO.
- 43-16. Refer to the Response for Comment 43-15 regarding the applicability of the 1998 CASA biosolids survey results to the analysis of impacts in the EIR. As described in the Response to Comment 26-15, chromium was not addressed in the CASA survey results because the Part 503 regulations do not require testing or regulation of chromium. Agencies responding to the CASA survey typically analyze generated biosolids only for the constituents that require testing per the Part 503 regulations.
- 43-17. Comment noted. No changes to the draft EIR are needed.
- 43-18. No test results for SOCs were available in the CASA survey because the Part 503 regulations do not require testing or regulation of SOCs.
- 43-19. Municipal agencies generating biosolids meet stringent standards for coliform organisms in biosolids. The CASA survey results did not include values for pathogens because it is presumed that all biosolids would meet the minimum Part 503 regulations for pathogen concentrations. Sample results also were not available in the CASA survey for other nonregulated pathogens because the Part 503 regulations do not require testing or regulation of these constituents.
- 43-20. See Responses to Comments 43-16, 43-18, and 43-19 regarding constituents for which data are available in the 1998 CASA survey results.
- 43-21. The percentage of currently generated biosolids that meets EQ or other regulatory standards is not relevant to the impact analysis. The EIR identifies the environmental effects of reusing biosolids that meet Class A or Class B standards established by EPA in its Part 503 regulations. How much of the material meets either standard will not alter the range of impacts anticipated in the EIR. See also Response to Comment 43-4 regarding information sources for existing sludge volumes and quality.
- 43-22. Quality analysis, control, and pretreatment inspection are the responsibility of POTWs and the RWQCBs. The effectiveness of these analyses and inspections can be determined in the

GO process because all biosolids must be tested for compliance with GO standards before any action on permits. If future advancements occur in treatment technology, it is assumed that the quality of biosolids will improve. The impact analysis in this EIR would, therefore, be even more conservative than the risk analyses conducted for the Part 503 regulations, which have been used as the starting point for analyzing the proposed GO's impacts. Future trends in biosolids quality are expected to be positive as pretreatment programs become more effective and municipal and industrial waste treatment technology improves.

43-23. See Responses to Comments 43-11 and 43-12.

43-24. SWRCB staff proposes prescribing more stringent requirements than those in the Part 503 regulations. To date, nothing warrants major deviations. The state's pretreatment standards stem from the federal regulations establishing such standards. Also, the goal of the proposed regulatory process (the GO) is to provide environmental protection from operations using biosolids as a soil amendment or fertilizer. It is not intended to enforce more aggressive pretreatment standards on industry or to tighten existing regulations on biosolids applications such that more sewage sludge is placed in landfills or is enhanced to provide a better product for the user.

43-25. See Responses to Comments 37-2, 37-3, and 43-11.

43-26. See Responses to Comments 37-3 and 43-28.

43-27. The commenter presents a series of quotes and summaries of statements from various articles regarding the U.S. standards for use of biosolids on land as compared to what is happening in other countries (primarily those in Europe). See Master Response 12 for a discussion of this issue.

43-28. This comment advocates a very different regulatory approach to setting cumulative loading limits of metals in soils to which biosolids have been added. The proposed approach to be adopted by SWRCB staff in the GO is based on comprehensive risk assessment studies conducted during EPA's development of the Part 503 regulations. These regulations define, based on exposure and risk assessment pathways, the upper limits or levels of metals that are tolerable in soils and do not have environmental or public health consequences. These are environmental- and health-based risk standards.

The commenter advocates development of loading limits predicated on soil-based standards. This approach would establish an acceptable upper limit based on a statistical analysis of the current concentration of various metals in California soils, with an allowable increase in the concentration.

The approach used in California to regulate land application of biosolids is the same as that used in virtually every state. As noted in Sections 9, 10, and 11 of the GO, it is based on the extensive research and public hearing process that went into EPA's development of the

Part 503 regulations. These have been modified to reflect the unique soil and crop conditions and other environmental concerns in California. A soil-based standard may regulate the metals content of fertilizers in California, but unlike such a standard for biosolids land application, would not set limits on the amount of fertilizer a farmer could spread on his land. This would instead be based on sound agronomic practice and would be at the discretion of the farmer. If regulations are developed by the California Department of Food and Agriculture that pertain to the metals content of fertilizers, and biosolids or sewage sludge is considered a fertilizer (which they are), then these regulations would also automatically apply to biosolids applicators, whether or not they are part of the GO. Conceivably, these would affect ceiling limits of biosolids.

One similar aspect of fertilizer and biosolids best management practices is that the application rate should be based on a consideration of site soil conditions and crop use. In the Part 503 regulations, this applies only to nitrogen. In the GO, this will be required as part of the program for all nutrients and metallic elements, with the further stipulation that some sites may not be suitable for biosolids applications because of soil limitations (see Mitigation Measure 4-1). Similar requirements are not currently in California fertilizer law, but restrictions may be increasingly placed on agricultural practices, particularly nutrient management, through imposition of the RWQCB's TMDL program.

Although the approach advocated by the commenter has some merit and may be applicable if adopted by the California Department of Food and Agriculture for fertilizer regulation, there is no compelling need to abandon the Part 503 program for annual application and cumulative loading limits developed by the EPA and used almost universally across the United States.

43-29. See Response to Comment 43-28.

43-30. SWRCB staff does not feel that a compilation of all regulations that have been developed by other local, state, or national entities regarding the land application of biosolids would be relevant to the EIR impact analysis. In the process of developing the proposed GO, many local and state regulations were reviewed; the critical elements to the EIR impact analysis are the provisions and conditions that have been incorporated into the GO. Other regulations have been developed that are more conservative or more liberal, but the EIR is intended to analyze only the regulations proposed in the GO.

43-31. The information in the draft EIR regarding San Luis Obispo County regulation of land application was incorrect. Further review has indicated that the county does not have an ordinance that is an effective ban on biosolids land application. Land application operations have been proposed in the county, but to date, public opposition has blocked such proposals. Table 9 on page 16 of Appendix C of the draft EIR is modified to remove San Luis Obispo County from the effective ban list.

The No-Project Alternative described in Chapter 14 provides an impact analysis of what would happen in absence of the GO. Regulation by local ordinance would continue in its current form. The effects of this alternative are clearly stated beginning on page 14-7 of the draft EIR. Regulation by local ordinance in the absence of the federal Part 503 regulations is not a feasible alternative. The SWRCB cannot override federal regulation.

- 43-32. The alternative regulatory methodologies referred to by the commenter are primarily encompassed by regulations and standards of European countries. Refer to Master Response 12 for a discussion of U.S. versus European land application regulations and philosophy. The EIR does not include an impact analysis of these other regulatory methodologies because they would not substantially reduce significant adverse effects expected from the proposed GO. The heavy metal restrictions in these alternative methodologies are certainly more conservative than those in the Part 503 regulation and the proposed GO, but significant effects from heavy metals are not expected from implementing the proposed GO. It is SWRCB's position that the scientific basis for adopting much more stringent land application controls has not been established.
- 43-33. Information regarding the differing regulatory regimes in the U.S. and European countries is presented in Master Response 12.
- 43-34. See the Response to Comment 37-3 and Master Response 12. The SWRCB has not neglected consideration of other regulatory options. It has chosen to use an approach that has been peer-reviewed and tested throughout the United States. This approach has proven to be successful.
- 43-35. See the Responses to Comments 37-3 and 43-34 and Master Response 12.
- 43-36. SWRCB staff respectfully disagrees with the commenter regarding the acceptability of the EIR. A range of feasible alternatives capable of avoiding or minimizing the adverse effects of the proposed project are addressed in Chapter 14 of the draft EIR. As indicated in other responses above, the SWRCB feels the risk-based approach to developing biosolids land application regulations is effective and consistent with federal regulation.
- 43-37. The Modified GO could have included the more stringent limitations advocated by the commenter. However, those stricter limitations would not necessarily protect the environment any more than the existing Part 503 regulations. The Part 503 regulations are designed to protect the environment. Dose is what makes a pollutant toxic; it has not been shown that the limitations in the Part 503 regulations allow a lethal dose of either pathogens or other pollutants. Under CEQA, alternative approaches to meeting the project's objectives need be analyzed only if significant adverse effects of the proposed project cannot be avoided.
- 43-38. The RWQCBs have qualified technical staff and enforcement mechanisms capable of ensuring compliance, enforcing conditions of the GO, or revoking biosolids application

rights under the GO. While advocating extensive research on soils, crops, air monitoring data, and “preapplication data,” the merit in assessing these subjects for evaluating environmental impacts, given the costs to perform such research and the anticipated environmental effects, is not substantiated. Also, please see Responses to Comments 21-75 and 21-84.

- 43-39. The enforcement success and shortcomings of the SWRCB and RWQCBs in waste discharge requirement oversight have been reviewed frequently. Overall, the programs have been and continue to be successful. Responsible agencies are aware of SWRCB’s role and its activities. Records are primarily kept at the RWQCB offices where they are needed by field staff. Centralized record keeping would be duplicative or inefficient given California’s size. However, databases are kept that track enforcement, monitoring report submittal, fee payment, and permitting. The SWRCB does keep a centralized file system for the pretreatment program. The comment does not indicate the merit of using wastewater effluent quality to characterize biosolids or how such information affects the proposed use of biosolids for land application under the GO, nor is it clear why a discussion of the analytical methods used in characterizing biosolids will assist in assessing environmental impacts. The comment assumes that biosolids with pollutants that exceed the GO limits would be applied in violation of the GO. Assessing violations of legal requirements and peripheral issues is beyond the scope of this process.
- 43-40. SWRCB staff has not selectively chosen its sources of information for this EIR and has not knowingly misrepresented the results of any studies cited in the document. The concerns relevant to the National Research Council (1996) report and the Dorn et al. (1985) report are presented below in Responses to Comments 43-47 and 43-50 and Master Response 18.
- 43-41. Comment noted. The text for the draft EIR, page 1-5, first full paragraph, is revised as follows:

In addition to holding public scoping meetings and distributing the NOP, SWRCB staff formed a technical advisory group (TAG) to provide input during preparation of the EIR and the GO. Meetings of the TAG have been held intermittently since August 1998. The TAG ~~includes~~ invited staff members of the state and federal agencies (SWRCB, RWQCBs, California Department of Toxic Substance Control [DTSC], DHS, DFA, California Department of Fish and Game [DFG], IWMB, California Air Resources Board [CARB], Delta Protection Commission, EPA, U.S. Fish and Wildlife Service, and Natural Conservation Service), representatives of publicly owned treatment works (POTWs) ~~and land appliers~~ (California Association of Sanitation Agencies [CASA] and Tri-TAC), and representatives of special interest groups (California Farm Bureau Federation, Planning and Conservation League, California Communities Against Toxics, Association of California Water Agencies, Sierra Club, and California Environmental Health Associations). Of those invited, members that participated at

meetings or through correspondence included RWQCBs, DTSC, DHS, DFA, IWMB, CARB, Delta Protection Commission, EPA, CASA, Tri-TAC, California Farm Bureau Federation, Association of California Water Agencies, and California Environmental Health Associations. Representatives from a biosolids applier industry (BioGro) and an anti-biosolids activist group (Center for Sludge Information) also attended one meeting and provided input.

However, the comment also alludes to a selectivity of facts presentation. For this issue, see Responses to Comments 43-42, 43-47, and 43-50.

- 43-42. SWRCB staff disagrees that the GO and draft EIR exclude information in the 1996 National Research Council report, given the context of the citations in the comment. Text on page 5-26 of the draft EIR specifically describes supporting information related to potential impacts from increased incidence of disease among humans coming into contact with biosolids at application sites. Therefore, other findings and results that were reported by NRC are not necessarily relevant to that particular section of the draft EIR. The case is similar for Finding No.10 in the GO, which characterizes the main findings of the NRC report and was not intended to be an exhaustive description of the entire report.
- 43-43. The comment questions whether the use of the word “included” is appropriate when referring to requirements in the GO that are also conditions of the Part 503 regulations. SWRCB staff does not believe that the word “included” is inappropriate. The GO is a new state regulation that will be applicable to the responsible parties actually applying biosolids to land, whereas the Part 503 regulations are a federal regulation applicable primarily to generators of biosolids. Therefore, SWRCB staff is indeed “including” elements of the Part 503 regulations to create the GO’s regulatory structure. Also refer to Master Response 6 for more detail regarding the appropriate use of test results under the GO for fecal coliform and salmonella density.
- 43-44. The GO has been modified to further clarify the appropriate use of test results under the GO for fecal coliform and salmonella density. Please refer to Master Response 6.
- 43-45. SWRCB staff does not intend to regulate biosolids sold for home use in bags or other containers. These biosolids are regulated under the Part 503 regulations, which require annual pollutant loading rates not to be exceeded, and have labeling requirements that inform the user of the pollutant content in the biosolids.
- 43-46. While risk assessments were not performed for all compounds potentially present in biosolids, EPA base regulation on scientifically sound judgments with respect to the probability of environmental risks. EPA determined that regulations for organic compounds were not necessary because they were either present in sufficiently low concentrations, no longer allowed for manufacture or use in the United States, or present at low frequencies among tested biosolids samples. Site-specific reports that have challenged the adequacy of

the risk assessments were reviewed as part of the draft EIR process and found to lack sufficient scientific basis to warrant further modification in the GO. EPA has also successfully refuted claims of inadequacies.

- 43-47. The comment states that the draft EIR and GO partially ignored the recommendation of the 1996 report by the NRC to reevaluate the 30-day grazing prohibition on lands where biosolids have been applied. This statement is not correct. The impacts associated with grazing animals on lands where biosolids have been applied was evaluated in the draft EIR and additional mitigation measures (4-2 and 5-2) were included that recommend extension of the grazing restriction for 60-90 days, depending on ambient air temperature where Class B biosolids have been applied.
- 43-48. The referenced findings in the GO are, from an overall standpoint, accurate. However, the comment assumes that biosolids are a problem for all farmers to apply, without regard to end use. Farmers accepting biosolids as a source of fertilizer will have detailed, accurate information on the content of this material and can make independent judgments about its relative value for their crops. The GO promotes the farmers' interest in this respect.
- 43-49. See Master Response 18.
- 43-50. Text of the draft EIR was revised to reflect the concerns expressed for accuracy in the interpretation of the report. The language and changes are noted in Master Response 18 regarding the Ohio farm study. The results of the Ohio study are not the principal basis for impact conclusions in the EIR. The study is, however, one of the few meaningful epidemiological surveys of human exposure to land-applied biosolids, in spite of its limited application to other locations and conditions.
- 43-51. The concerns expressed and the request that information be corrected and revised are reflected in the changes to the draft EIR, as noted in Master Response 18 addressing the Ohio farm study.
- 43-52. See Master Response 18.
- 43-53. The concerns noted are addressed in Master Response 18 on the Ohio farm study.
- 43-54. The commenter suggests that the impact analyses contained in the draft EIR "consistently omit information which would demonstrate the significance of the relationship between the controversy and the potentiality of impacts." It is also suggested that the impacts are greater than assumed in the draft EIR. SWRCB staff agree that there is continuing controversy over the adequacy of the EPA Part 503 regulations and the risk assessments conducted to establish those regulations. However, criticisms of these regulations have been thoroughly reviewed, and the literature regarding the relationship of biosolids land application and significant public health impacts has been researched. While concern may be warranted, SWRCB staff find no evidence that its conservative approach to developing its own land application

regulation is flawed and likely to result in significant adverse effects on human health or the environment.

- 43-55. The SWRCB staff respects the commenter's opinion but does not agree that the EIR fails to provide sufficient information to assess the proposed GO's environmental impacts.
- 43-56. SWRCB staff has reviewed and considered the information in CSI's three-part presentation of information regarding impacts and potential mitigation. No further response is required.
- 43-57. SWRCB staff has not intentionally excluded information from its process of developing a GO and presenting its potential environmental effects in this EIR.
- 43-58. The commenter notes that the draft EIR mentioned the potential adverse impacts on soil microorganisms from biosolids application on agricultural lands, but the draft EIR did not point out that the EPA's risk assessment studies failed to consider them. The commenter also noted that other risk assessment approaches completed by other entities (e.g., the Dutch government) using similar pathways but more conservative assumptions produced different, lower limits to allowable metals loading and ceiling limits. CSI noted that this fact contributes to the controversy between the regulated community and concerned or interested observers.

Comment noted. See Master Response 12 regarding United States versus European standards. The draft EIR stated that there is considerable controversy over the adequacy of the Part 503 regulations. It also stated that the Oak Ridge National Laboratory is currently conducting research on biosolids impacts to soil microfauna.

The Part 503 regulations did consider literature that studied the effects of biosolids on soil microorganisms. However, depending on results of ongoing research, the regulations may be updated. The Part 503 regulations have been supplemented and strengthened in the GO and mitigation measures have been recommended to reflect California conditions and concerns. That this topic remains controversial is evidenced by the fact that many commenters charged that some of the mitigation measures were unnecessary and the Part 503 regulations were entirely sufficient, while others thought that the GO program did not go far enough in regulating biosolids use on agricultural lands and were not sufficiently protective of long-term land productivity.

- 43-59. This comment explains the fact that individual trace metals, present in low levels and considered by themselves to be safe, can have additive or synergistic toxic effects on crops when combined with other metals in low levels. The commenter indicates that the EPA analysis used to develop the Part 503 regulations considered metals individually in arriving at loading limits and did not consider potential additive and synergistic effects in setting limits.

Comment noted. However, it is not believed necessary to specify additional mitigation measures to address this issue. The EPA risk assessment was very conservative. For example, the EPA used a comprehensive approach to establish pollutant (metals) limits protecting plants from the potentially phytotoxic metals in biosolids. Multiple procedures were used by the EPA scientists to establish the metals limits, and the procedure giving the most stringent limit for a specific metal was chosen as the pollutant limit for Pathway 8, the phytotoxicity pathway.

Given the conservative nature of EPA-determined loading limits, the greatest concern in terms of additive and synergistic effects will likely occur near the upper limits of application, some 10-20 years or more following biosolids land application. In most cases, as emphasized in draft EIR Chapter 4, metals-related phytotoxicity problems are most likely to occur on sandy, low-organic-matter-content, acidic soils where metal-sensitive crops are attempted to be grown. The soils with the highest constraints to good biosolids application (those with significant soil limitations) have been excluded from the GO. Growth of metal-sensitive crops on soils with moderate limitations would not be allowed.

This mitigation measure has been revised to also restrict bioaccumulative crops (see Response to Comment 26-28). This may place a constraint on application of biosolids to lands with a history of growing such sensitive/bioaccumulative crops, as landowners must consciously decide to allow application and agree to change their cropping patterns. This is something most farmers would not consider lightly. Continued research on biosolids applications by universities and state and federal agencies will help to resolve this and other remaining controversies. Important findings will result in changes to the Part 503 regulations. These changes may become a part of the GO if deemed appropriate by SWRCB staff.

Regarding potential synergistic effects, refer to Response to Comment 33-3.